



Washington State: Apples, Software, Airplanes and Climate Solutions

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Suppose the dire warnings about how expensive it will be to prevent climate disruption had some basis in fact. Suppose (as the tiny but well-funded cadre of professional climate change skeptics insists) climate stabilization efforts would cost billions and stunt growth. You know what? We'd still have to do it.

Why? Because there is *no* plausible scenario for making the transition to clean energy that would be more economically devastating than the climate changes in store if we *don't* make the transition. The cost of inaction is so high that we *could* afford even expensive actions, if they were necessary. (They're not. Read on.)

Sure, there's some residual uncertainty about the timing of the impacts and how climate change will play out locally. But no credible source disputes the sobering physical facts: Carbon dioxide, methane, and other "greenhouse gases" trap heat. We're emitting these gases (mostly from energy use) at an unprecedented and accelerating rate. Atmospheric concentrations of carbon dioxide are up - *way* up - from their pre-industrial levels. Ice core samples confirm that global temperatures move, pretty much in lockstep, with carbon dioxide concentrations. Global average temperatures are on the rise. Glaciers are retreating. Spring comes a week earlier to northern latitudes than it did 30 years ago. Extreme, costly weather events are becoming commonplace. My six year-old has seen several "hundred-year floods" on our favorite Northwest rivers. As Don Hodel actually said back when he was BPA Administrator, some folks can't see the writing on the wall until they've got their backs up against it.

It's tough - and admittedly speculative - to tally the bill for this reckless experiment in global climate chemistry. But let's just take a crude look at the categories of costs, as detailed in recent work by the UW's Joint Institute for the Study of Atmosphere and Oceans. (Stop when you think the cumulative total exceeds the cost of learning to make super-efficient use of energy sources that don't emit carbon.)

- Flooding, mudslides, and inundation of low-lying coastal areas in winter and early spring.
- Crop losses from drought in summer.
- Salmon extinction as summer flows dry up and water temperatures in both streams and the ocean rise.
- Hydropower losses due to substantial reduction in snowpack.

Are we there yet? Could we have paid for a sustainable energy path with the money we spent on cleaning up after storms, building dykes, and building new power plants to replace lost hydro? Could we have spared the salmon? Now let's add:

- More widespread, hotter forest fires.
- Reduced range for the region's most productive conifers, including firs and cedars, as grasslands expand up the eastern front of the Cascades.
- Outbreaks of tropical diseases borne by insects as they expand their range north with the newly hospitable climate.
- Accommodating environmental refugees from low-lying nations.

That's quite a budget we're piling up here..... A fortune we should be willing to invest in clean energy, simply because the costs of failing to make such investments are so unthinkable high.

Fortunately, this exercise is totally hypothetical. The premise is wrong. We don't have to buy new calculators with 15 digit readouts to compare the cost of turning away from the global warming path with the cost of sweating it out. Because the truth is, the transition to efficient use of renewable energy is likely to be the most productive economic strategy available to us - even before we count the costs of the alternatives. A German best-seller entitled "Faktor Vier" (Factor Four) by Amory and Hunter Lovins and Ernst von Weizsacker maintains that we could squeeze four times as much work out of existing energy and materials and save money in the bargain. As Donella Meadows notes in last Monday's LA Times, this means "we could run our economy while reducing our assault on the atmosphere by 75%. Or double economic output while cutting emissions in half."

For a glimpse at the economic promise of renewable resources, look no further than the economy of the Pacific Northwest. Our electric power system is the envy of the nation precisely because we rely on a renewable resource - hydropower - for the bulk of our electric power needs. The hydropower system has serious environmental flaws of its own, and we need to fix them. But the point remains - far-sighted investment in a non-depletable, non-carbon electric power source has left this region with an extraordinary source of competitive advantage. And we've stretched that investment by harvesting over a thousand megawatts of wasted energy - enough to power Seattle - through utility-sponsored energy efficiency initiatives in the last 15 years. Had we continued on the ill-fated nuclear power path that we began in the 1970s, we would have paid roughly 4 times as much for the power we saved. By choosing efficiency instead, we save roughly half a billion dollars *annually* in Washington State.

The opportunities ahead are no less promising.

The fatal flaw in the logic of those who insist that making the transition to efficient use of renewables will be an economic disaster is this: They assume we're stupid. They assume that if we're standing in the middle of the road with a truck bearing down us, we'll freeze in the headlights. Holding to this assumption, they reach the unstartling conclusion that the truck will flatten us and it will hurt. But the truth is, we won't stand still and take the hit. We'll adapt; we'll innovate; we'll engineer new and better ways to provide energy services.

Washington is well-positioned to lead this explosion of innovation. Consider tools we already have:

- The Evergreen State is home to the world's leading manufacturer of "balance of systems" technologies - the inverters that turn DC power from solar arrays into usable, storable AC power (Trace Engineering in Arlington).
- In Vancouver, Siemen's Solar manufactures the silica crystals that feed the world's largest production line for solar photovoltaic arrays. Several other solar manufacturers, dealers, and installers are headquartered here.
- The energy efficiency industry employs 10-15 thousand people in Washington, including many of the world's leading pioneers in the field.
- Washington is home to a variety of other institutions that boast some of the planet's most talented energy innovators, including Pacific Northwest Labs, the Bonneville Power Administration, the US Department of Energy Support Office for the entire western region, and Washington State University's Energy Extension Program.
- Washington enjoys very favorable trade relationships with growing Pacific Rim economies, where demand for energy is growing rapidly. Expanding those relationships is a top priority for many state policy-makers. It may also be the key to engaging the developing world, and particularly China, in an effective global climate stabilization strategy.
- Washington is a leader in the kinds of software and electronics technologies that support cutting-edge innovations in energy management and renewable energy application.

With all that talent on hand, Washington is in a very strong position to prosper from the transition to a post-carbon energy system. A look at recent activity on the clean energy front suggests that the transition may already be beginning:

- In Arlington, Trace Engineering is now marketing sine wave inverters that can plug a solar array directly into AC appliances, batteries, and the electric grid. They've got their 100 watt inverters down to about the size of a Walkman. This technology puts small solar systems within reach of many homeowners, particularly in remote locations. President Clinton's Million Solar Roofs initiative wouldn't be possible without these devices. Demand for them is growing dramatically.
- In Issaquah, JX Crystals has developed a technology, originally pioneered by Boeing, that can deliver approximately 100 times more power per square inch of photovoltaic cell than conventional solar modules. They have just introduced a gas/propane furnace that incorporates this high-powered cell into its design and delivers both heat and electricity.
- Up in Winthrop, the tiny Okanogan Electric Cooperative has installed a solar PV system at its new headquarters, and is now helping its members follow suit. They allow customers to run their electric meters backwards and sell power back into the grid in the summer, when these systems produce more than the household can use.
- In Lacey, Applied Power Corporation, a subsidiary of Idaho Power, is the leading supplier of integrated photovoltaic systems to the federal government. The feds are ramping up solar procurement as part of their climate change stabilization efforts.
- In Vancouver, Siemen's Solar, the worlds largest manufacturer of solar PV arrays grows the silica crystals that make PV cells. They expect to ramp up production 50% in the next 18 months, and they've developed a proposal to significantly increase the energy efficiency of their manufacturing facilities.
- The Spokane Intercollegiate Research and Technical Institute has developed a commercial fuel cell that produces electric power from natural gas with water as the only byproduct.
- CARES -- a consortium of small public utility districts -- is working with the Bonneville Power Administration to develop the region's first commercial windfarm near Goldendale.

The list goes on. Is it a clean energy revolution taking root in Washington State? Not yet. While we have talent and commitment in abundance, energy efficiency investment by electric utilities in Washington State is in steep decline, dropping by more than half since 1994. Restructuring of the electric power industry has opened the market to suppliers who do not make the same energy efficiency and renewable energy investments that our public and private utilities do, so competitive pressure is squeezing those investments out.

Future consumers will pay, in both dollars and environmental damage, for the efficiency investments we're failing to make today. Particularly with the ascendance of climate stabilization as an urgent national and global priority, we should be missing no opportunity to capture cost effective energy efficiencies. This is particularly true now, because with strong economic growth, we are building an extraordinary number of new buildings. If we build them wrong today, they'll be gulping and wasting energy long into the future, when the need for reductions in greenhouse gases will be even more acute.

And on the transportation front, the news is worse still. Greenhouse gas emissions from cars and airplanes are growing at an alarming rate in Washington, much faster than the economy as a whole. Transportation demand management efforts have achieved some real success in Washington, but the effect of those successes is dwarfed by the astronomical growth in vehicle-miles travelled. To substantially reduce greenhouse gas emissions in Washington, we'll have to build more efficient vehicles, use them less and power them with cleaner fuels. (UW climatologist Richard Gammon notes that every time we burn a gallon of conventional fuels, we emit 5 pounds of carbon. He pictures throwing a small bag of charcoal briquets out the car window every 20 miles or so.)

Still, Washington's in the pole position to lead the transition to a sustainable energy future. Why Washington? That question came up this week at a local downlink of the national videoconference on the President's Million Solar Roofs initiative. The speaker was Bill Roppenecker, the President of Trace Engineering in Arlington. When someone asked him why cutting edge solar industries were located in Washington State of all places, he cited two reasons. First, the market is global, and Washington has exceptionally good trade relationships, especially in fast-growing Pacific Rim economies.

Second, Roppenecker said the solar industry is here simply because "We like it here."

Don't we all? A place as attractive as the Pacific Northwest arguably has the most to lose in the event of sweeping ecosystem disruptions. And with our extraordinary array of talent and resources in the fields of renewable energy and energy efficiency, we also have much to gain from an ambitious climate stabilization effort.